Urban Estuary Protection and Restoration: A Report Highlighting Tools to Enhance Federal Coordination

Executive Summary

The Subcommittee on Integrated Management of Ocean Resources (SIMOR) was formed in March 2005 as part of the ocean governance structure described in the President's Ocean Action Plan (www.oceans.ceq.gov). SIMOR focuses on implementing ocean, coastal, and Great Lakes management actions that will benefit from interagency coordination. Its work is designed to complement the efforts of individual Departments and Agencies, as well as other interagency groups.

SIMOR seeks to identify and promote opportunities for collaboration and cooperation among federal agencies and to build partnerships among federal, state, tribal, and local authorities, the private sector, international partners, and other interested parties. These cooperative efforts help develop and implement management strategies that ensure continued conservation of coastal and marine habitats and living and non-living resources, while also ensuring that the American public enjoys and benefits from these same resources.

In March 2006, SIMOR issued its formal workplan which describes specific activities intended to promote responsible use and management of our ocean and coastal resources.

SIMOR identified four priorities as initial focus areas:
• Regional and local collaboration
• Use of ocean science and technology in ocean resource management
• Enhance ocean, coastal, and Great Lakes resource management to improve use and conservation
• Enhance ocean education

One of the work plan action items under the regional and local collaboration focus area addresses urban estuaries. SIMOR charged a work team to identify ways to enhance federal coordination and services supporting regional protection and restoration of urban estuaries and habitats that would assist local communities in these areas manage their growth and redevelopment while sustaining ecosystems.

This report outlines tools to enhance federal coordination and services targeting habitat protection and restoration of urban estuaries. The report examines strategies that have been successful in reversing loss of estuarine species and habitats and includes a variety of case studies on regional/local scenarios where federal agencies are coordinating protection and restoration efforts well. These case studies address the effects of urbanization on estuaries at diverse locations including Chesapeake Bay and the Great Lakes, and will offer lessons learned for other regions/localities. We hope the report will facilitate cooperation and communication on the national scale.

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Introduction

An estuary is an arm of the sea at the lower end of a river where fresh water meets the salt water of the ocean. Estuarine ecosystems are characterized by high biological productivity, great ecological value, complex environmental gradients, and many interconnected processes. These ecosystems, especially the tidal creeks and rivers that enter estuaries along the shores, form the lateral boundaries (edges) of estuaries, and are the first zone of impact for most contaminated runoff. They are also critical feeding grounds, spawning areas, and nursery habitats for many species of fish, shellfish, birds, waterfowl, and mammals.

Estuaries represent vital economic, environmental, social, and cultural centers that provide jobs, homes, recreation, and a valued quality of life for the people who live, work and recreate there. Yet, these estuaries are facing increased pressures from rapid population growth and urbanization which causes the degradation of habitats that are vital to marine and coastal resources. Currently, over 110 million Americans live in coastal counties (within 50 miles of the coast). On average, coastal counties are growing nearly three times as fast as non-coastal counties. To accommodate the population growth, more and more upland forest is cleared for residential, commercial and industrial ventures. Urbanization of America's estuaries may represent the single most significant human alteration of our nation's coastal ecosystems in our nation's history.

This report outlines tools to enhance federal coordination and services targeting habitat protection and restoration of urban estuaries. It examines strategies that have been successful in reversing loss of estuarine species and habitats and includes a variety of case studies on regional/local scenarios where federal agencies are coordinating protection and restoration efforts well. These case studies address the effects of urbanization on estuaries at diverse locations including the Chesapeake Bay and the Great Lakes, and will offer lessons learned for other regions/localities. We hope the report will facilitate cooperation and communication on the national scale.

This report complements the efforts of the SIMOR work plan workgroup that developed *A Report for the Subcommittee on Integrated Management of Ocean Resources: Top 10 Marine and Coastal Cooperative Conservation Lessons Learned*. Building on the 2005 White House Conference on Cooperative Conservation, this report also includes recent examples from several SIMOR agencies and other existing reports on cooperative resource management. Although the report refers generally to marine and coastal resources and habitats, the lessons learned are applicable to urban estuaries as well.

The report presented here was developed with the participation of a work team comprising the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), the Environmental Protection Agency (EPA), and the Federal Highway Administration.

Urban Estuary Toolbox

The following toolbox outlines the many tools agencies and organizations have utilized (or currently utilize) to enhance federal coordination and services targeting habitat protection and restoration of urban estuaries. Though certainly not comprehensive, this toolbox will generally be applicable to the vast majority of estuarine settings.

Land Use Planning & Coastal Development

Special Area Management Plans
http://coastalmanagement.noaa.gov/special.html

A special area management plan (SAMP) is a management tool for programs to address difficult resource management issues, or land/water use conflicts in a more integrated manner through the application of comprehensive land and water use planning and management. SAMPs are resource management plans and implementation programs developed to improve the management of a discreet geographic area. SAMPs are employed most often to supplement existing management programs, in specific areas where the broad program policies are not working well, or where there is a need to better align coastal policy or to address complex multi-jurisdictional coastal issues. A number of states have developed SAMPs to address special coastal areas, including urban estuaries.

Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects
http://www.environment.fhwa.dot.gov/ecological/eco_index.asp/

This vision document describes an interagency-supported framework for making infrastructure projects more sensitive to wildlife and their ecosystems. It recognizes open public and stakeholder involvement as the cornerstone for cooperative conservation. The guide articulates a vision of how infrastructure development and ecosystem conservation can be integrated to harmonize economic, environmental and social needs and objectives. The federal and state agencies involved in Eco-Logical's development recognized a shared vision of a sustainable natural environment. Eco-Logical is now being implemented through a series of grants, the first round of which were awarded in 2007.

Green Highways Partnership
www.greenhighways.org

The Green Highways Partnership (GHP) is a voluntary, public/private initiative, comprised of environmental, industrial, and governmental collaborators. This initiative seeks to incorporate environmental streamlining and stewardship into all aspects of the highway lifecycle, through concepts such as integrated planning, regulatory flexibility, and market-based rewards. Green Highways are defined by an effort to leave the project area "better than before" through community partnering, environmental stewardship, and transportation network improvements in safety and functionality. The combined

resources of the GHP partner base ensure that sustainability becomes the driving force behind infrastructure development.

Coastal Pollution

Nonpoint Source Pollution and Erosion Comparison Tool
http://www.csc.noaa.gov/crs/cwq/nspect.html

The Nonpoint Source Pollution and Erosion Comparison Tool (N-SPECT) is a complex yet user-friendly geographic information system (GIS) extension that helps coastal managers and local decision makers predict potential water-quality impacts from nonpoint source pollution and erosion. Users first enter information about their area (land cover, elevation, precipitation, and soil characteristics) to create the baseline information. They can then add different land cover change scenarios (such as a development) to get information about potential changes in surface water runoff, nonpoint source pollution, and erosion.

Green Infrastructure Action Strategy
http://www.epa.gov/npdes/pubs/gi_action_strategy.pdf

Developed by the Partners for Green Infrastructure (American Rivers, Association of State and Interstate Water Pollution Control Administrators, Low Impact Development Center, National Association of Clean Water Agencies, Natural Resources Defense Council, and EPA), this Action Strategy details a wide variety of efforts that will be pursued over the years by the partner organizations to reduce stormwater runoff, combined sewer overflows, and nonpoint source pollution. The Action Strategy covers seven broad categories, including research, outreach, and demonstration projects.

EPA's Nonpoint Source Outreach Toolbox
http://www.epa.gov/nps/toolbox/

The Nonpoint Source (NPS) Outreach Toolbox is intended for use by state and local agencies and other organizations interested in educating the public on nonpoint source pollution or stormwater runoff. The Toolbox contains a variety of resources to help develop an effective and targeted outreach campaign.

Features of the Toolbox include: exemplary outreach examples culled from the catalog for increasing awareness and changing behaviors across each of the six targeted topics (general stormwater and storm drain awareness, lawn and garden care, pet care, septic system care, motor vehicle care, and household chemicals and waste) and organized by media type; surveys of public attitudes and perceptions regarding NPS problems and solutions, and evaluations of the effectiveness of some local NPS media campaigns; and EPA's *Getting in Step* Outreach Series that includes EPA's flagship publication *Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*, which presents the outreach development process as a logical, easy-to-apply sequence of steps.

National Coastal Condition Report II
http://www.epa.gov/owow/oceans/nccr/2005/downloads.html

The National Coastal Condition Report II (NCCR II), January 2005, is the second in a series of environmental assessments of U.S. coastal waters and the Great Lakes. The report includes assessments of 100 percent of the nation's estuaries in the contiguous 48 states and Puerto Rico, providing a statistically valid "snapshot" of the ecological health of U.S. coastal ecosystems on a regional and national scale.

The first National Coastal Condition Report (NCCR I), published in 2001, reported that the nation's estuarine resources were in fair[1] condition. The NCCR I used available data from 1990 to 1996 to characterize about 70% of the nation's estuarine resources. Agencies contributing these data included EPA, NOAA, FWS, and USDA.

This second National Coastal Condition Report (NCCR II) is based on available data from 1997 to 2000. These data are representative of 100% of estuarine acreage in the conterminous 48 states and Puerto Rico, and they show that the nation's estuaries continue to be in fair[2] condition. Agencies contributing data to this report include EPA, NOAA, FWS, and the U.S. Geological Survey (USGS). Several state, regional, and local organizations also provided information on the current condition of the nation's coasts. EPA plans to release the NCCR III in late 2008. It is based on data collected in 2001 and 2002, along with trends data from as early as 1990 in some regions of the country.

Decision Support

Impervious Surface Analysis Tool
http://www.csc.noaa.gov/crs/cwq/isat.html

The Impervious Surface Analysis Tool (ISAT) is used to calculate the percentage of impervious surface area of user-selected geographic areas (e.g., watersheds, municipalities, subdivisions). NOAA Coastal Services Center and the University of Connecticut Nonpoint Education for Municipal Officials (NEMO) Program developed this tool for coastal and natural resource managers.

Coastal Protection & Restoration

Coastal Wetlands Planning, Protection and Restoration Act: Project Standard Operating Procedures Manual

[1] Overall condition of the nation's estuaries was fair based on seven basic indicators of ecological condition—water clarity, dissolved oxygen, loss of coastal wetlands, eutrophic condition, sediment contamination, benthic condition, and accumulation of contaminants in fish tissue.
[2] This rating is based on five indicators of ecological condition: water quality index (including dissolved oxygen, chlorophyll a, nitrogen, phosphorus, and water clarity), sediment quality index (including sediment toxicity, sediment contaminants, and sediment total organic carbon [TOC]), benthic index, coastal habitat index, and a fish tissue contaminants index. The resulting ratings for each indicator are then used to calculate both the overall regional ratings and an overall national rating of coastal condition.

http://www.mvn.usace.army.mil/pd/CWPPRA-SOP-version13-FINAL-apprbyTC14Mar07.pdf

This document provides a good example of standard operating procedures that federal agencies can use when coordinating restoration and protection efforts.

Performance Indicators Visualization and Outreach Tool
http://www.epa.gov/owow/estuaries/pivot/overview/intro.htm

This PIVOT module for the National Estuary Program (NEP) highlights common habitat degradation and loss problems faced by NEP communities around the country. PIVOT's interactive graphics and maps are designed to help users better understand the issues and visually track the NEP's progress toward achieving its habitat restoration goals.

The PIVOT framework for reporting performance was developed by the NOAA Coastal Services Center. While PIVOT is applied by the EPA NEP Program at a national level, the framework is also an effective local tool, helping individual communities assess and communicate the success of local management actions.

Handbook for Developing Watershed Plans to Restore and Protect Our Waters
http://www.epa.gov/owow/nps/watershed_handbook/pdf/handbook.pdf

This handbook is intended to help communities, watershed organizations, and state, local, tribal and federal environmental agencies develop and implement watershed plans to meet water quality standards and protect water resources. It was designed to help any organization undertaking a watershed planning effort, and it should be particularly useful to persons working with impaired or threatened waters. EPA intends for this handbook to supplement existing watershed planning guides that have already been developed by agencies, universities, and other nonprofit organizations. The handbook is generally more specific than other guides with respect to guidance on quantifying existing pollutant loads, developing estimates of the load reductions required to meet water quality standards, developing effective management measures, and tracking progress once the plan is implemented.

Community & Watershed Management

Cooperative Conservation Lessons Learned
http://ocean.ceq.gov/about/docs/SIMOR_Coop_Cons_Lessons.pdf

This report of the top 10 marine and coastal cooperative conservation lessons learned identifies lessons that states and regions could apply to their individual regional contexts. Building on the 2005 White House Conference on Cooperative Conservation, this report also includes recent examples from several SIMOR agencies, and other existing reports on cooperative resource management.

An Agenda for Action: Moving Regional Ocean Governance from Theory to Practice

http://www.jointoceancommission.org/resource-center/1-Reports/2007-08-01_Agenda_for_Action_Regional_Ocean_Governance.pdf

In March 2007 the Joint Ocean Commission Initiative and the Monterey Bay Aquarium's Center for the Future of the Oceans convened a workshop on regional ocean governance. Leaders and experts from emerging and established regional ocean governance initiatives around the country were asked to identify the practical steps needed to strengthen and expand the capacity of regions to work collaboratively toward improved ocean and coastal health. Informed by the discussion that took place at the workshop, the Joint Ocean Commission Initiative and the Monterey Bay Aquarium issued this report, *An Agenda for Action: Moving Regional Ocean Governance from Theory to Practice*, to stimulate the ocean policy community to take concrete steps to create effective and sustained regional ocean governance initiatives. The report also presents an overview of the concepts of marine ecosystem-based management and area-based management, both of which are integral to understanding regional ocean governance.

Community-Based Watershed Management Handbook
http://www.epa.gov/owow/estuaries/nepprimer/handbook.htm

This handbook describes the highly successful approaches to watershed management implemented by the 28 NEPs. The NEPs, unique partnerships of the EPA and numerous federal, state, and local organizations, work together to address coastal watershed management challenges. This document presents new information from nearly 20 years of the NEP experience and describes how the NEPs:

- protect and restore estuaries by developing and implementing comprehensive management plans;
- foster consensus on difficult issues by establishing effective governance structures;
- conduct vigorous education and outreach by involving the public;
- obtain significant funding by leveraging scarce resources;
- establish credibility by using science to inform decision making; and
- sustain their efforts by measuring and communicating results.

The lessons learned contained in this handbook are relevant not only to the NEPs, but to other watershed organizations, including local governments, nonprofits, and others who are working to establish, implement, and evaluate watershed protection and restoration efforts.

Ecosystem-Based Management Tools Network
www.ebmtools.org

The Ecosystem-Based Management (EBM) Tools Network is an alliance of EBM tool developers, practitioners, and training providers to develop EBM tools and support their use in EBM implementation in coastal and marine environments and the terrestrial environments that affect those environments. The Network includes representatives from

federal agencies, universities, and nonprofit organizations. EBM tools are software or other highly documented methods that can help implement EBM by:

- Providing models of ecosystems or key ecosystem processes;
- Generating scenarios illustrating the consequences of different management decisions on natural resources and the economy;
- Facilitating stakeholder involvement in planning processes.

EBM tools include data collection and management tools; data processing tools; conceptual modeling tools; modeling and analysis tools (such as watershed models, marine ecosystem models, dispersal models, habitat models, socioeconomic models, and model development tools); scenario visualization tools; decision support tools (such as coastal zone management tools, fisheries management tools, conservation and restoration site selection tools, land use planning tools, and hazard assessment and resilience planning tools); project management tools; stakeholder communication and engagement tools; and monitoring and assessment tools.

Data Inventories & Assessments

NOAA Coastal Change Analysis Program
http://www.csc.noaa.gov/crs/lca/ccap.html

NOAA's Coastal Change Analysis Program (C-CAP) products are part of a nationally standardized database of land cover and change information, developed using remotely sensed imagery. The NOAA Coastal Services Center has completed baseline C-CAP land cover and land cover change information for all coastal regions of the U.S., excluding Alaska and U.S. territories. Trend information will give important feedback to managers on the success or failure of management policies and programs, and aid in developing a scientific understanding of the Earth system and its response to natural and human-induced changes. This knowledge will eventually allow for the prediction of impacts caused by these changes and the assessment of their cumulative effects, helping coastal resource managers make more informed regional decisions.

Environmental Atlas of the Lake Pontchartrain Basin
http://pubs.usgs.gov/of/2002/of02-206/

The University of New Orleans (UNO) and the U.S. Geological Survey (USGS) have conducted research to build a strong technical basis for formulation of sound strategies and programs for restoration. These organizations and many others are working cooperatively to develop the necessary tools to help restore the Lake Pontchartrain Basin. This is one of these tools.

The *Environmental Atlas of the Lake Pontchartrain Basin* is designed to provide citizens, planners, managers, educators, scientists and other professionals with a multidisciplinary and integrated source of information on Lake Pontchartrain and its surrounding Basin. A tremendous body of published and unpublished information exists in libraries, archives,

government agencies, universities and laboratories and is not readily available to the public or other professionals working within the Lake Pontchartrain Basin. This Atlas has drawn upon these sources. In addition, there are many chapter sections in this Atlas that provide new and original information never presented before. The intent is to gather the relevant and more significant portions of this existing information into an Atlas in support of the restoration and recovery of this important estuarine ecosystem. This Atlas is by no means intended to include all the information available to fully understand the Lake Pontchartrain Basin. It is meant to be a starting point for appreciating the complexity of this estuarine ecosystem as its restoration moves forward, and a pathway to other sources of information.

Gulf of Mexico Legislative Atlas
http://csc-s-maps-p.csc.noaa.gov/LegAtlas/viewer.html?Service=LegAtlas_GoMex

This Atlas identifies federal programs effecting natural resources throughout the Gulf region.

Spatial Trends in Coastal Socioeconomics
http://marineeconomics.noaa.gov/socioeconomics/

Spatial Trends in Coastal Socioeconomics (STICS) offers demographic, economic, and recreation data for the Gulf of Mexico from the U.S. Census Bureau**,** Bureau of Economic Analysis**,** and Outdoor Recreation data.

National Ocean Economics Program (NOEP)
http://noep.mbari.org/

Established in 1999, the National Ocean Economics Program (NOEP) provides a full range of the most current economic and socio-economic information available on changes and trends along the U.S. coast and in coastal waters. The program is funded by federal, state, university, and private grants and contracts.

National Wetlands Inventory (NWI)
http://www.fws.gov/nwi

The National Wetlands Inventory, working with over 100 partners, has produced digital wetlands maps for about 56 percent of the nation. These scientific maps are widely used by federal, state, tribal, and local governments and the public to help identify, conserve, and restore wetland resources across the American landscape. Maps cover all of the nation's coasts for the conterminous United States and Hawaii, and part of Alaska. As many coastal maps are based on older technology and imagery from the 1970s and 1980s, federal and state agencies and others are working together to update and do more detailed mapping.

Issues likely to be addressed by assessments using Inventory data include modeling for sea-level rise and its effects on government lands and community infrastructure; planning

for restoration of the Gulf and Atlantic Coast areas affected by subsidence, sea-level rise, and hurricanes; planning for energy independence both for green and extractive energies; carbon sequestration in wetlands; planning, modeling, research, and monitoring for strategic habitat conservation activities, especially as it related to global climate change, by federal, state, tribal and local agencies; recovering endangered species, fish, migratory birds, marine mammals, and other imperiled species; and planning for National Wildlife Refuges, National Parks, military bases, and other federal and state lands and private and business development, just to name a few uses.

Data Hub
http://www.chesapeakebay.net/data/index.cfm

This data retrieval interface provides access to several types of data related to the Chesapeake Bay. The "CBP On-line databases" can be queried based upon user-defined inputs such as geographic region and date range. Each query results in a downloadable, pipe-delimited text file that can be imported to any program (e.g. SAS, Excel, Access) for further analysis.

Education & Outreach

Coastal America Coastal Ecosystem Learning Centers (CELCs)
www.coastalamerica.gov

In 1996 the Coastal America Partnership established a network of Coastal Ecosystem Learning Centers (CELCs), comprised of a number of the nation's premier aquaria and marine learning institutions. The goal of each CELC is to educate and involve the public in protecting the nation's coastal and ocean ecosystems.

There are currently 20 designated CELCs in the United States and one in Mexico. Building on their role as public education facilities, the CELCs use the resources of the Coastal America Partnership to expand the educational opportunities they offer to their communities. With combined resources, the CELCs increase public awareness and understanding about coastal and ocean issues and conduct community-based restoration projects.

Each of these CELCs is dedicated to teaching their audiences about the regional ecosystems that they inhabit, as well as larger ocean issues. The Coastal America Partnership continues to expand its CELC network both nationally and internationally to achieve greater ocean literacy among the public and inspire environmental stewardship.

Training Programs

Coastal Community Planning & Development (CCPD)

http://www.csc.noaa.gov/training/comm_plan.html

Instruction in alternative development principles and their implementation is the focus of this course, which was designed to help community leaders mitigate the negative impacts of growth. This course, which was developed in conjunction with EPA, will actively engage participants in learning about alternatives to how and where growth will occur in their communities. It will provide them with the background, examples, and strategies to support alternative development efforts in coastal communities.

NERR Coastal Training Program

http://www8.nos.noaa.gov/publicnerrs/training.aspx

The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to individuals who are responsible for making decisions that affect coastal resources. Through this program, National Estuarine Research Reserves can ensure that coastal decision-makers have the knowledge and tools they need to address critical resource management issues of concern to local communities.

Coastal Training Programs offered by Reserves focus on issues such as coastal habitat conservation and restoration, biodiversity, water quality and sustainable resource management. Programs target a range of audiences, including land-use planners, elected officials, regulators, land developers, community groups, environmental non-profits and coastal businesses. These training programs provide a range of opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems.

Urban Estuaries: Case Studies

Urban estuaries face an increasing number of complex challenges, stemming from a myriad of environmental and societal pressures. Numerous community, state, and federal (regional) partnerships have developed in response to the declining state of urban estuaries and other waterbodies. By engaging multiple stakeholders on national, regional and local levels, there is an opportunity for decision makers to reduce duplication of efforts, minimize conflicts, and maximize limited resources.

Though diverse in geographic scope, these programs tackle many similar issues, such as nonpoint source pollution, and habitat restoration. The collaborative nature of these programs has allowed for the development of innovative approaches to address these problems, uniquely tailored to local environmental conditions, and to the needs of local communities and constituencies, yet applicable to some extent to other urban estuaries facing the same or similar environmental threats.

Regional Partnerships

Chesapeake Bay Program
www.chesapeakebay.net

The Chesapeake Bay Program is responsible for coordinating the restorations efforts of the largest estuary in the United States, the Chesapeake Bay. The Chesapeake Bay Program partners include the states of Maryland, Pennsylvania, Virginia, New York, Delaware, and West Virginia; the District of Columbia; the Chesapeake Bay Commission; the Environmental Protection Agency, representing the federal government; and participating citizen advisory groups.

Over 16 million people live throughout the Bay's watershed, and the population is growing by more than one million per decade. As the watershed population increases, so does the amount of developed land; researchers expect that if current trends continue, by 2030, developed land will increase by more than 60%. Although local growth may benefit the local economy, it can be taxing to the environment at the same time. For instance, urban development contributes substantial amounts of sediments to the Bay. Urban and suburban lands can contribute twice as much sediment as compared to natural landscapes. Bay Program partners have promoted a series of best management practices to manage stormwater runoff and thereby minimize the impact of construction projects on the local environment.

Since its inception in 1983, the Bay Program's highest priority has been the restoration of the Bay's living resources. In June 2000, Chesapeake Bay Program partners built on these previous agreements by adopting the Chesapeake 2000 Agreement, a strategic plan to achieve a vision for the future of the Chesapeake Bay—a vision that includes abundant, diverse populations of living resources fed by healthy streams and rivers, sustaining strong local and regional economies, and a unique quality of life.

To address the adverse impacts of growth, Bay Program partners are promoting ecologically based site designs to minimize stormwater runoff and fall lawn fertilization to minimize the loss of excess nutrients. The Partners have developed a Resource Lands Assessment to help local and state planning agencies identify valuable lands to protect for habitat, water quality, timber management, and farming purposes. Most recently, Bay Program partners have committed to assess the cumulative impacts of future urban growth and land use change on the health of the Chesapeake Bay by projecting land use changes and nutrient loads out to 2030.

The 2000 Agreement has other goals and specific objectives that include habitat protection and restoration, land use, stewardship, and community engagement. The evolution of the Chesapeake Bay Agreement illustrates the progression from a common vision to a specific goal that is implemented through a series of specific actions. In the Chesapeake Bay, the emphasis has evolved from an initial focus on the mainstem of the Bay to actions taken by individuals and local governments throughout the watershed.

Great Lakes Interagency Task Force
http://www.epa.gov/glnpo/index.html

The Great Lakes - Superior, Michigan, Huron, Erie and Ontario - are a dominant part of the physical and cultural heritage of North America. Shared with Canada and spanning more than 750 miles (1,200 kilometers) from west to east, these vast inland freshwater seas have provided water for consumption, transportation, power, recreation and a host of other uses.

The Great Lakes are the largest surface freshwater system on the Earth. They contain about 84 percent of North America's surface fresh water and about 21 percent of the world's supply. Nearly 25 percent of Canadian agricultural production and 7 percent of American farm production are located in the basin. More than 30 million people live in the Great Lakes basin - roughly 10 percent of the U.S. population and more than 30 percent of the Canadian population. The daily activities of these people, from the water consumed to the waste returned, directly affect the Great Lakes environments.

In spite of their large size, the Great Lakes are sensitive to the effects of a wide range of pollutants. Major stresses on the lakes include toxic and nutrient pollution, invasive species and habitat degradation. Sources of pollution include the runoff of soils and farm chemicals from agricultural lands, waste from cities, discharges from industrial areas and leachate from disposal sites. The large surface area of the lakes also makes them vulnerable to direct atmospheric pollutants that fall as rain, snow, or dust on the lake surface, or exchange as gases with the lake water. Outflows from the Great Lakes are relatively small (less than 1 percent per year) in comparison with the total volume of water. Pollutants that enter the lakes are retained in the system and become more concentrated with time.

In May 2004, President Bush signed an Executive Order creating the Great Lakes Interagency Task Force, under the lead of EPA. The Task Force brings together twelve

Agency and Cabinet officers to provide strategic direction on federal Great Lakes policy, priorities and programs. In addition, the order directs EPA to work with Great Lakes States, tribal and local governments, communities, and other interests to convene a complementary process of regional collaboration.

EPA's work is handled through its Great Lakes National Program Office. The Boundary Waters Treaty of 1909 and the 1987 Great Lakes Water Quality Agreement (GLWQA) with Canada provide the basis for international efforts to manage this shared resource. The Great Lakes 5-Year Strategy, developed jointly by EPA and its multi-state, multi-Agency partners and built on the foundation of the GLWQA, provides the agenda for Great Lakes ecosystem management, and Lakewide Management Plans have been developed for each lake.

Federal Estuary Programs

Environmental Protection Agency National Estuary Program

The NEP is a unique voluntary program that operates through broad-based partnerships and consensus building to achieve environmental results. EPA provides technical and financial assistance and management guidance to the 28 NEPs across the country. Each NEP works with stakeholders to identify problems in the estuary, develop specific actions to address those problems, and create and implement a formal management plan to restore and protect the estuary. Effective projects and programs innovated by one of the NEPs often serve as models for similar initiatives in other NEPs and coastal areas. The following offer two examples from the NEP program.

New York / New Jersey Harbor Estuary Program
www.harborestuary.org

The Harbor Estuary Program (HEP), part of the larger network of the NEPs, is a successful partnership of local and state government agencies, the business community and conservation groups.

New York/New Jersey Harbor (Harbor) abounds with diverse natural resources, yet it is in the heart of the most densely populated region of the nation. The Harbor is an urban estuary with a large human population that places many competing demands on the water and surrounding land. The HEP is addressing many environmental issues through a variety of technical, educational, and regulatory programs. Combined sewer overflows, historical toxic contamination of sediments, and limited remaining natural habitat are among the main issues in this estuary.

The primary planning document produced by the HEP is the Comprehensive Conservation and Management Plan (CCMP), completed in March of 1996 and signed by the Governors of New York and New Jersey in the Fall of 1997. A subsequent action plan, released in February 2008, serves as an organizing instrument used to assist with the implementation of the major actions in the HEP's CCMP. It is

organized around five major themes or goals: Clean Up Pollution in the Estuary; Habitat and Ecological Health; Improve Public Access; Support an Economically and Ecologically Viable Estuary and Port; and Public Education and Community Involvement. This is a working document that will be updated periodically to reflect new information, evolving priorities, and progress on recommended priorities.

Tampa Bay Estuary Program
www.tbep.org

Tampa Bay is another one of the 28 estuaries in the NEP. The Tampa Bay National Estuary Program (TBNEP) was established in 1991 as a partnership of Hillsborough, Manatee, and Pinellas counties; the cities of Tampa, St. Petersburg, and Clearwater; the Southwest Florida Water Management District; the Florida Department of Environmental Protection; and EPA.

Spanning 400 square miles, with a drainage area nearly six times as large, Tampa Bay and its watershed stretch from the spring-fed headwaters of the Hillsborough River to the salty waters off Anna Maria Island. Florida's largest open-water estuary harbors a rich and diverse assemblage of plants and animals, along with a rapidly growing human population that has made the region the second largest metropolitan area in the state.

More than 2.3 million people live in the three counties directly bordering Tampa Bay – Hillsborough, Manatee and Pinellas. That number is expected to grow by nearly 19 percent by the year 2015, as approximately 500 people move to one of those three counties each week. With such fast-paced growth, redressing past damage to Bay habitats and protecting them in the future, remain the greatest challenge for bay managers.

In 1998, the TBNEP partners signed a formal Interlocal Agreement, and ancillary agreements, pledging to achieve the goals of the newly completed CCMP for Tampa Bay, called *Charting The Course*. The Plan culminated nearly six years of scientific research into the Bay's most pressing problems, and reflected broad-based input from citizens, groups, and communities with a common interest in a healthy bay as the cornerstone of a prosperous economy.

TBEP leverages the resources of program partners by financing cutting-edge research into key problems impacting the Bay; sponsoring demonstration projects to test innovative solutions to these problems; providing "Mini-Grants" to community groups to engage the public in Bay restoration; and developing educational programs targeting key segments of the Bay community – including teachers, boaters and homeowners.

Tijuana River National Estuarine Research Reserve (NERR)
www.nerrs.noaa.gov/TijuanaRiver/

The National Estuarine Research Reserve System (NERRS) is a network of 27 reserves established for long-term research, education, and stewardship of the nation's estuaries. This partnership program between NOAA and the coastal states protects more than one million acres of estuarine land and water; provides essential habitat for wildlife; offers educational opportunities for students, teachers, and the public; and serves as a living laboratory for scientists.

The Tijuana River NERR is located in a highly urbanized environment. The Reserve is a largely undiscovered, biologically diverse open space on the Pacific Ocean, bordered in all terrestrial directions by dense urbanized communities in the U.S. and Mexico. The Reserve encompasses beach, dune, mudflat, saltmarsh, riparian, coastal sage and upland habitats surrounded by the growing cities of Tijuana, Imperial Beach and San Diego. Three quarters of the Reserve's watershed is in Mexico and the management, education and research issues involve an international perspective. Critical issues confronted by the Reserve include habitat restoration, endangered species management, management of the wastewater from Mexico, sediment management, and the integration of recreation and habitat conservation and restoration.

The Tijuana River NERR is currently revising their Comprehensive Management Plan (CMP) to fulfill its mission to estuarine protection over the period of 2007 – 2012. The CMP prepared in 1999 for the Tijuana Slough National Wildlife Refuge (NWR), located within the Reserve, was developed using a consensus-based planning process involving the Tijuana River NERR Advisory Council, staff members of the operating agencies, and community members. This collaborative process marked an innovation in the preparation of NERR and NWR management plans and continues to reflect the planning agencies' commitment to public and community involvement in decision-making through the update process for this 2007 CMP document.

In addition to the CMP, the Reserve initiated the Tijuana Estuary Tidal Restoration Program (TETRP), a large, multi-phased wetland restoration program involving up to 500 acres. Its primary objective is to restore habitat values that have been lost and to increase the exchange of water in a tidal cycle. This will enhance flushing, improve water quality and control sedimentation.

During the past seven years, improvements have been made in the southern end of the Reserve to address major sedimentation problems. These efforts will continue with salt marsh restoration within the Reserve and an expansion of sediment control work within Mexico. In addition, the Reserve is looking to expand its influence beyond its borders in both education and research, for the betterment of coastal wetlands throughout the southern California / northern Baja biogeographic region.

Urban Watershed Associations & Foundations

Passaic River Coalition[3]

www.passaicriver.org

The Passaic River Coalition (PRC) was established in 1969 and incorporated in 1971. The Passaic River Watershed is an interdependent system of water retention, transportation and use formed by nature and adapted to human needs. The PRC provides valuable assistance and stewardship for the preservation and protection of water resources in the Passaic River Watershed, which stretches from the headwater streams in the Highlands of New York and New Jersey, through vast tracts of wetlands in the central basin, into the heavily urbanized lower valley and out to Newark Bay and the Atlantic Ocean.

The Upper Passaic Conservation Committee, advised by PRC, assists localities in the Upper Passaic River basin to establish riparian buffers and protect groundwater recharge areas. The PRC is also assisting several watershed communities to create open space plans and natural resource inventories.

Using a coalition-building approach, the PRC has been successful in leading initiatives to protect drinking water, preserve sensitive wildlife habitat, improve water quality, create new open space, and promote natural flood control management. Management objectives are achieved through a highly successful process of education, research, and public service. The following examples of management objectives reflect the diverse nature of the issues confronting the Passaic River Watershed:

- Distribution of a model law to protect community wells from contamination;
- Development of Open Space Master Plans for counties and towns;
- Work on the Second Passaic River Restoration Plan to guide urban municipalities; in the creation of parks along the Lower Passaic River;
- Education for homeowners on backyard rain water management;
- Creation of the Blue Acres Program to buy homes in floodways; and
- Preservation of sensitive river front lands through our Land Trust Fund.

Lake Pontchartrain Basin Foundation[4]

www.saveourlake.org

Lake Pontchartrain is the largest estuary in southern Louisiana. It is an important recreational, commercial and environmental resource for New Orleans and southeastern Louisiana. Over the past 60 years, rapid growth and development within the basin, along with natural processes, have resulted in significant environmental degradation and loss of critical habitat in and around Lake Pontchartrain. Human activities associated with pollutant discharge and surface drainage have greatly affected the water quality in the Lake. This change is evident in the bottom sediments, which record the historic health of

[3] Source: www.passaicriver.org
[4] Source: www.saveourlake.org

the Lake. Also, land-altering activities such as logging, dredging, and flood control in and around the lake lead to shoreline erosion and loss of wetlands. The effects of pollution, shoreline erosion, and wetland loss on the Lake and surrounding areas have become a major public concern.

Since 1989, the non-profit Lake Pontchartrain Basin Foundation (LPBF) has led a coordinated effort to restore the environmental quality of the Basin through consensus-building on the environmental issues facing the Basin and development of strategies to manage and solve these problems.

To clean the rivers and streams in the Pontchartrain Basin, LPBF began the Sub-Basin Pollution Source Tracking Program in 2002 to track down and clean up fecal pollution sources. In this program LPBF combines water quality monitoring, assistance to wastewater treatment plants (WWTPs) and dairies with waste, and public outreach/education in cooperation with state and local agencies. LPBF piloted this program in the Bogue Falaya and Tchefuncte Watersheds (in St. Tammany Parish) in 2002. Based on that success, LPBF received an EPA Targeted Watershed grant and moved to the Tangipahoa and Natalbany Watersheds (in Tangipahoa Parish) in 2005.

In 2007, the Louisiana Department of Environmental Quality (LDEQ) used the Sub-Basin Program as a model for watershed targeting in their "LA Clean Waters" Program. LPBF is also working with Tangipahoa Parish, incorporating water quality issues into the Parish's master plan under development.

LPBF will continue working with state and parish entities to coordinate efforts within the watershed. The ultimate goal is to reduce fecal pollution to the Clean Water Act's "swimmable" criteria and get all Basin waterbodies removed from the Act's section 303(d) list.

Lessons Learned

As noted earlier in this report, our nation's estuaries continue to face many environmental threats. Federal agencies, along with their public and private partners, can enhance their ability to successfully address these challenges by identifying new and creative approaches to resource management, financing, and collaboration. Yet, we also should also strive to learn from relevant successes – and mistakes – of others.
The following lessons-learned[5] were developed in part by the Executive Director of the Chesapeake Bay Commission. Many of these lessons may be transferable to other environmental management and restoration efforts within urban estuaries.

Begin with comprehensive scientific studies that combine theory, detailed knowledge, monitoring, and modeling. Comprehensive coastal management programs must be based on the best available science and technology.

[5] Swanson, Ann P. "The Chesapeake Bay: Lessons Learned from Managing a Watershed." http://usinfo.state.gov/journals/itgic/0404/ijge/gj07.htm

Involve the highest levels of leadership possible. High-ranking political figures in each participating jurisdiction should be visibly involved in a coastal management program. Only these officials have the authority to endorse and implement policies developed by the program infrastructure.

Embrace clear, strong, specific, comprehensive, and measurable goals. The commitments should be realistic, but they should also challenge the programs to implement significant change. In addition, they should form the basis for periodic reevaluations of progress.

Encourage the participation of a broad spectrum of stakeholders. Ecosystems are extraordinarily complex, and managing them requires a complex array of representatives from all levels of government, the private sector, science, and the general public.

Provide incentives and methods for institutional cooperation. Behavioral change can have a huge multiplier effect. Effective coastal management cannot reside solely with governmental agencies and nongovernmental organizations.

Inform and involve the public. An informed and vocal public is the policy makers' greatest ally. Over two-thirds of the world's population lives close to a coastal sea or great lake. In addition to formal announcements and newsletters, nations can take advantage of their education infrastructure to teach ecological principles and environmental stewardship to the next generation of citizens.

Balance management strategy with available resources. No coastal management program will be successful if it exceeds available financial resources.

Test scientific theories and management approaches on a small scale. In many cases, small-scale project testing can be melded with local jurisdiction program development. This provides for development of partnerships and encourages more participants to become vested in the demonstration project.

Focus on integration of the work of government agencies. Integration requires the cooperation of diverse players who are often worlds apart. It involves constant communication and collaboration of multiple agencies at numerous levels of government to assure that activities complement, rather than conflict or duplicate.

Regularly reassess goals and progress. Periodic assessments involving the full range of stakeholders should be undertaken to gauge progress toward goals and utilize adaptive management to tailor restoration for each unique project or estuary. That process must also allow for changes in goals or the establishment of new ones as a result of advances in research.

Demonstrate and communicate results. Measuring progress and publicizing results are key to sustaining leadership commitment and public support. The frequent and open

sharing of information--whether good or bad --has been essential to maintaining the trust and commitment of the stakeholders involved.